

# Pesticide Poisonings and Illegal Pesticides

**Professor (Hanna-) Andrea Rother, PhD**  
Head of Division of Environmental Health  
School of Public Health and Family Medicine  
University of Cape Town

**Email:** [andrea.rother@uct.ac.za](mailto:andrea.rother@uct.ac.za)

**Twitter:** @harother

**Instagram:** uct\_environmentalhealth



**Division of Environmental Health**  
School of Public Health and Family Medicine  
Isikolo Sempilo Yoluntu kunye Namayeza Osapho  
Departement Openbare Gesondheid en Huisartskunde

 **UNIVERSITY OF CAPE TOWN**  
IYUNIVESITHI YASEKAPA - UNIVERSITEIT VAN KAAPSTAD

# Presentation Questions Addressed

- Why are pesticides a health risk concern?
- What are illegal pesticides and what are the issues of concern?
- What mechanisms are in place for end-users to understand risk info?
- How do end-users in South Africa access pesticide health risk info?



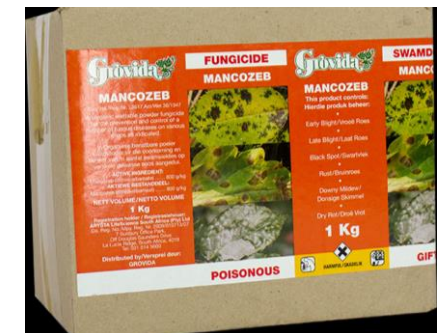
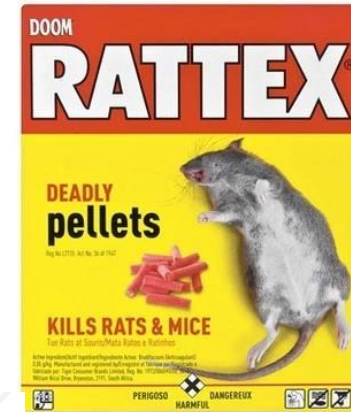
Why are pesticides a health risk  
concern in South Africa?

# What are pesticides?

- Substance for destroying, controlling or repelling pests

- Pesticides include:

- Herbicides
- Insecticides
- Rodenticides
- Fungicides nematocide
- Lice shampoos
- Mosquito repellents



# Multiple & Extensive Pesticide Exposure Risks

<b>Agriculture</b> <ul style="list-style-type: none"><li>• Crops; horticulture; weed control; chicken feed fly control</li></ul>	<b>Public Health</b> <ul style="list-style-type: none"><li>• Malaria; community pest control</li></ul>
<b>Borders</b> <ul style="list-style-type: none"><li>• Mosquito control on airplanes, phytosanitary &amp; foot/mouth disease control</li></ul>	<b>Public spaces</b> <ul style="list-style-type: none"><li>• Schools, hospitals, office buildings, public buildings (supermarkets, restaurants) land fills; weed control on pavements</li></ul>
<b>Domestic</b> <ul style="list-style-type: none"><li>• home &amp; garden use; lice shampoo; paints, hand wash</li></ul>	<b>Transport</b> <ul style="list-style-type: none"><li>• Land &amp; sea movement of pesticides; treated boat hulls</li></ul>
<b>Forestry</b> <ul style="list-style-type: none"><li>• Treated timber; alien invasive vegetation removal</li></ul>	<b>Veterinary purposes</b> <ul style="list-style-type: none"><li>• Livestock; domestic pets; foot &amp; mouth disease</li></ul>
<b>Leisure areas</b> <ul style="list-style-type: none"><li>• Hotels, golf courses</li></ul>	<b>Unregistered uses</b> <ul style="list-style-type: none"><li>• <b>Street pesticides</b>; self harm; problem animals; homicides; warfarin in street drugs</li></ul>
<b>Laboratories</b> <ul style="list-style-type: none"><li>• Research; export residue testing</li></ul>	<b>Migratory Pest Control</b> <ul style="list-style-type: none"><li>• Quelea birds; locusts</li></ul>
	<b>Rother, H-A SAMJ 2012</b>

# Pesticides Mode of Action

- Not all pesticides have the same mode of action
- All pesticides are toxic and could cause ill-effects in humans (even green labelled)

## → pesticides are indiscriminate

Pesticides can not tell whether a human is a pest or not

- **Rodenticides** – anticoagulant → blood thinners which cause internal bleeding to rodents and humans
- **Organophosphate insecticides** (e.g., methamidophos) – are neurotoxins resulting in damage to the nerves short and long term

## Mode of Action – how they work to control pest:

**Protectants:** applied to plants, animals, structures, and products to prevent entry or damage by a pest.

**Sterilants:** makes pests unable to reproduce. **Contacts:** kills pests simply by contacting them.

**Stomach poisons:** kill when swallowed.

**Systemics:** taken into the blood of an animal or sap of a plant. They kill the pest without harming the host.

**Translocated herbicides:** kill plants by being absorbed by leaves, stems, or roots and moving throughout the plant.

**Fumigants:** gases that kill when they are inhaled or otherwise absorbed by the pest.

**Anticoagulants:** prevent normal clotting of blood.

**Selective:** more toxic to some kinds of plants or animals than to others.

**Nonselective:** toxic to most plants or animals.

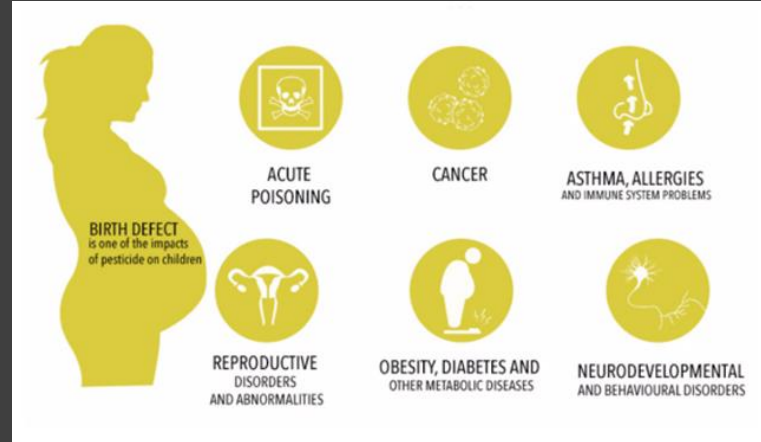
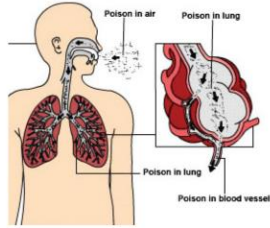
**Pheromones:** affect pests by changing their behavior.

## Acute Toxicity

- An adverse effect occurs within a **short time** of exposure to a single or repeated dose

⇒24 hours or less

- Measured by LD50 or LC50

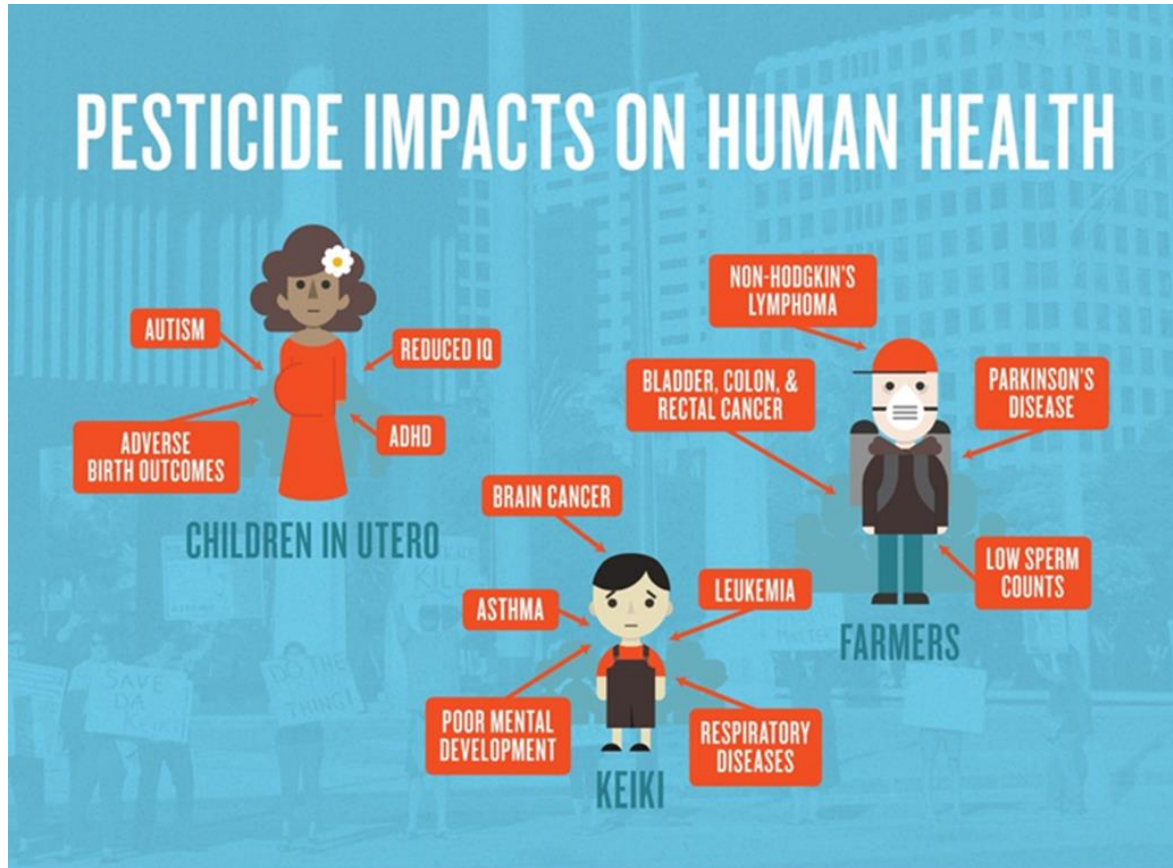


### ➤ Chronic effects examples include:

- Respiratory** (asthma, chronic bronchitis, lung cancer)
- Neurological** (Parkinson Disease)
- Reproductive** (infertility)
- Developmental** (behavioural disorders, low IQ, low birth weight, birth defects)
- Carcinogenic** (bladder, prostate, breast, stomach & bone cancers; leukaemia)
- Mutagenic** (genetic effects)
- Metabolic** (obesity, diabetes)

# Pesticide Health Risks

## Chronic Health Effects



## Acute Health Effects

Table General Symptoms that Might Indicate Pesticide Poisoning		
Mild Poisoning	Moderate Poisoning	Severe Poisoning
<p>Any of the following:</p> <ul style="list-style-type: none"> <li>• irritation of the nose, throat, eyes or skin</li> <li>• headache</li> <li>• dizziness</li> <li>• loss of appetite</li> <li>• thirst</li> <li>• nausea</li> <li>• diarrhea</li> <li>• sweating</li> <li>• weakness or fatigue</li> <li>• restlessness</li> <li>• nervousness</li> <li>• changes in mood</li> <li>• insomnia</li> </ul>	<p>Any of the mild symptoms, plus any of the following:</p> <ul style="list-style-type: none"> <li>• vomiting</li> <li>• excessive salivation</li> <li>• coughing</li> <li>• feeling of constriction in throat and chest</li> <li>• abdominal cramps</li> <li>• blurring of vision</li> <li>• rapid pulse</li> <li>• excessive perspiration</li> <li>• profound weakness</li> <li>• trembling</li> <li>• muscular incoordination</li> <li>• mental confusion</li> </ul>	<p>Any of the mild or moderate symptoms, plus any of the following:</p> <ul style="list-style-type: none"> <li>• inability to breathe</li> <li>• extra phlegm or mucous in the airways</li> <li>• small or pinpoint pupils</li> <li>• chemical burns on the skin</li> <li>• increased rate of breathing</li> <li>• loss of reflexes</li> <li>• uncontrollable muscular twitching</li> <li>• unconsciousness</li> <li>• death</li> </ul>





What are illegal pesticides and  
what are the issues of concern?

## Urban Areas – Extensive Pest Infestation; Poor Sanitation; Refuse = Multiple Breeding Sites



## Household pest problems according to housing type

	All households (N=199)	Shack (n=129)	Permanent House (n=70)
<b>Pests</b>			
Cockroaches	160 (80.4%)	105 (81.4%)	55 (78.6%)
Flies	154 (77.4%)	102 (79.1%)	52 (74.3%)
Rats	143 (71.9%)	100 (77.5%)	43 (61.4%)
Fleas	121 (60.8%)	87 (67.4%)	34 (48.6%)
Ants	90 (45.2%)	51 (39.5%)	39 (55.7%)
Mosquitoes	66 (33.2%)	41 (31.8%)	25 (35.7%)
Bedbugs	59 (29.6%)	42 (32.6%)	17 (24.3%)
Lice	4 (2.0%)	4 (3.1%)	0 (0.0%)
Scabies	3 (1.5%)	2 (1.6%)	1 (1.4%)

# Legality of Pesticides

## LEGAL

- Registered for use under Act 36 of 1947
- Label will have an L number



## ILLEGAL

- A pesticide not registered under Act 36 of 1947

### Street Pesticides:

#### Two types:

1. Pesticides **legally registered** for Agricultural uses and decanted into unlabelled domestic containers (e.g., juice bottles)/medicine bottles for household use – **illegal uses**
2. An **illegal pesticide** (e.g., cockroach chinks, Chinese Green Leaf packaged products **not registered**)

1



2



3



Which of these are legal pesticides in South Africa?

# Street Pesticides





- Salt River, WC, preliminary mortuary data from 2017-2019 showing an increase in child deaths linked to street pesticides (terbufos).
- Mortuary data valuable poisoning surveillance data







**BLACK-SEED-OIL**

Sunna Trading Blackseed Oil may prove useful for the prevention, stabilization and healing of the following conditions:

- High blood pressure
- Diabetes
- Asthma
- Allergies (and other respiratory conditions)
- Psoriasis (and other skin conditions)

**R7500**  
50ml



















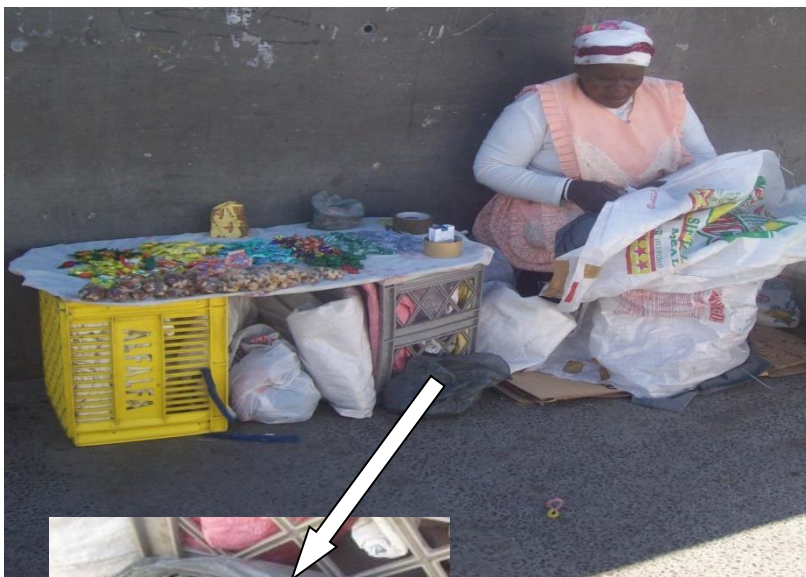




# Profile of Pesticide Sellers – Exposure Risks

- Stationary

- Mobile



# Street Pesticides Profitable: Economic Benefits Outweigh Health Costs



- One pesticide seller bought cypermethrin for R73.00, decanted and sold for profit of R500.00
- Individual bottles sold for R25 each

# Common Active Ingredients Found in Unlabelled Street Pesticides – Lab Analysis Findings

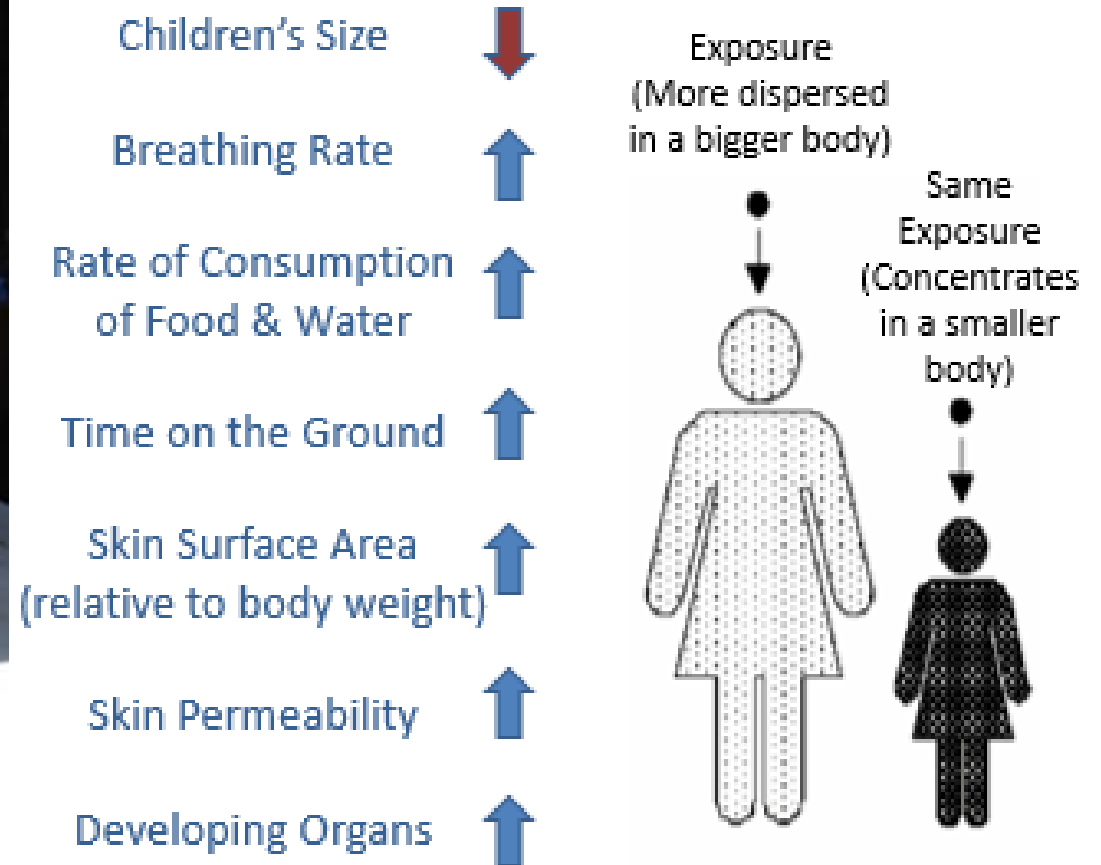
Active Ingredient	Pesticide Class	WHO Classification – Acute Hazards	Potential Chronic Health Effects
<b>Methamidophos</b>	organophosphate	Highly Hazardous <b>Class Ib</b> (oral LD <sub>50</sub> :30mg/kg)	Neurotoxic, reproductive toxic, developmental toxic
<b>Cypermethrin</b>	pyrethroid	Moderately Hazardous <b>Class II</b> (oral LD <sub>50</sub> :c250*)	Neurotoxic, reproductive toxic, developmental toxic, cancer
<b>Chlorpyrifos</b>	organophosphate	Moderately Hazardous <b>Class II</b> (oral LD <sub>50</sub> :135mg/kg)	Neurotoxic, dermatotoxic, birth defects
<b>Chlorpyrifos-methyl</b>	organophosphate	Limited acute hazards <b>Class U</b> (oral LD <sub>50</sub> :>3000mg/kg)	Neurotoxic, dermatotoxic, birth defects
<b>Aldicarb</b>	carbamate	Extremely Hazardous <b>Class Ia</b> (oral LD <sub>50</sub> :0.93mg/kg)	Neurotoxic, reproductive toxic, developmental toxic, cancer, dermatotoxic

(Rother 2010 IJOEH)

\*c = toxicity data for pyrethroids is highly variable according to isomer ratios.

# Children are not little adults – Exposure Differences

Children's Increased Vulnerability to Toxics  
(Compared to Adults)



# Why are highly toxic and illegal street pesticides so widely used?

## WHAT ARE THE PROBLEMS?

### ❖ Low Socio-Economic Status

- Pest infestation high in townships due to poor sanitation, overcrowding, low quality houses, litter, and poor refuse collection.
- Demand for cheap/effective control
- High unemployment



### ❖ Poisonings & Deaths

- SP too toxic for home use
- Poisonings occurring
- Children under 5 most at risk of death from SP
- Used for self-harm (suicide)
- Long-term health effects
- Occupational health risks for vendors

### ❖ Under Reporting

- Although pesticide poisoning is a notifiable **medical condition**, it is underreported by health workers (especially doctors)
- District and provincial data not reaching National Dept of Health

### ❖ Poor Implementation of Legislation

- Easy access
- Ineffective raids of vendors
- Stockpiles of unlabeled & highly hazardous pesticides after local authority raids of vendors

### ❖ Lack of Risk Information

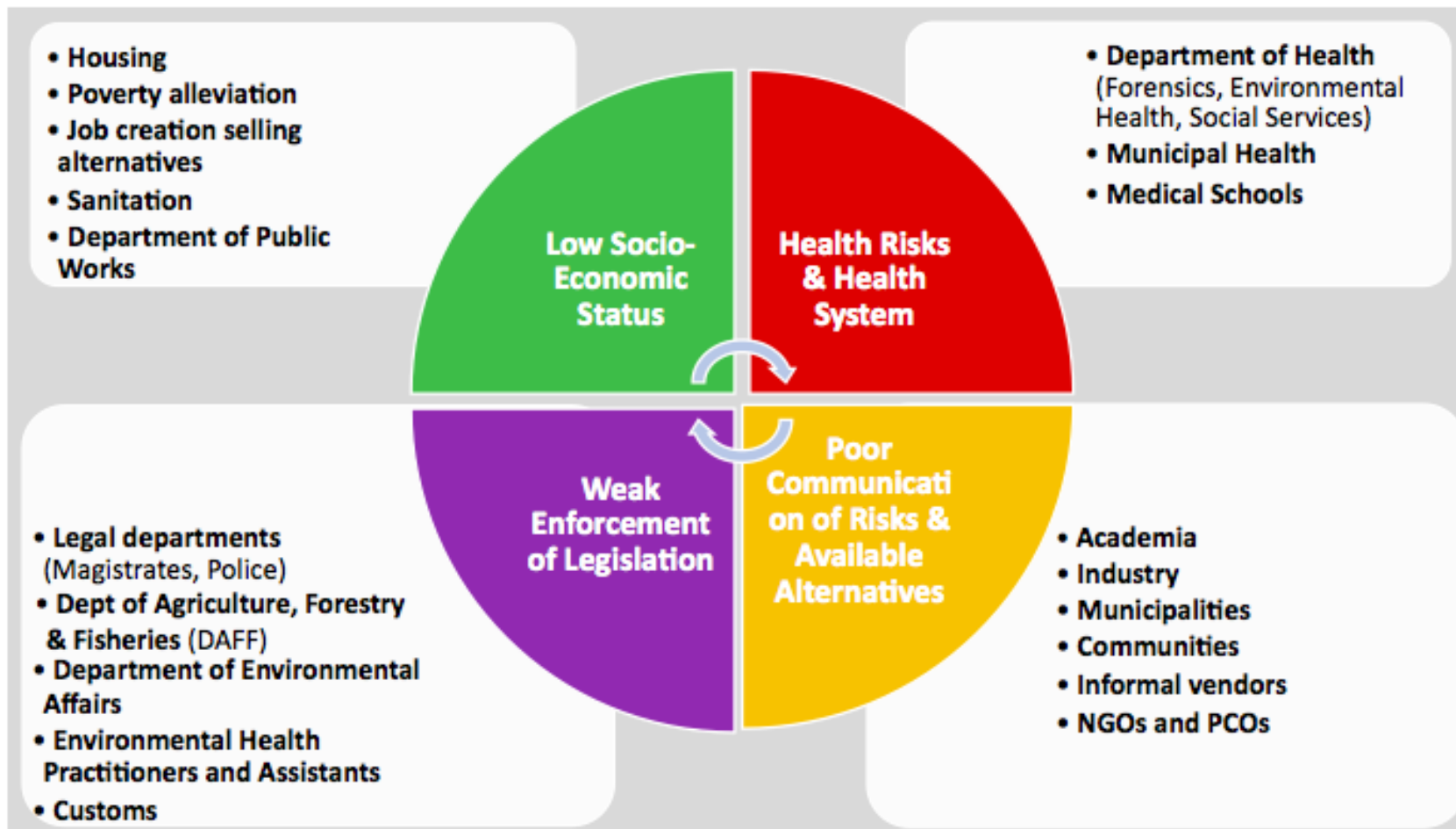
- Communities unaware of health risks
- Pesticides unlabeled
- Not all residents are controlling for pests

### ❖ Lack of Pest Control Alternatives

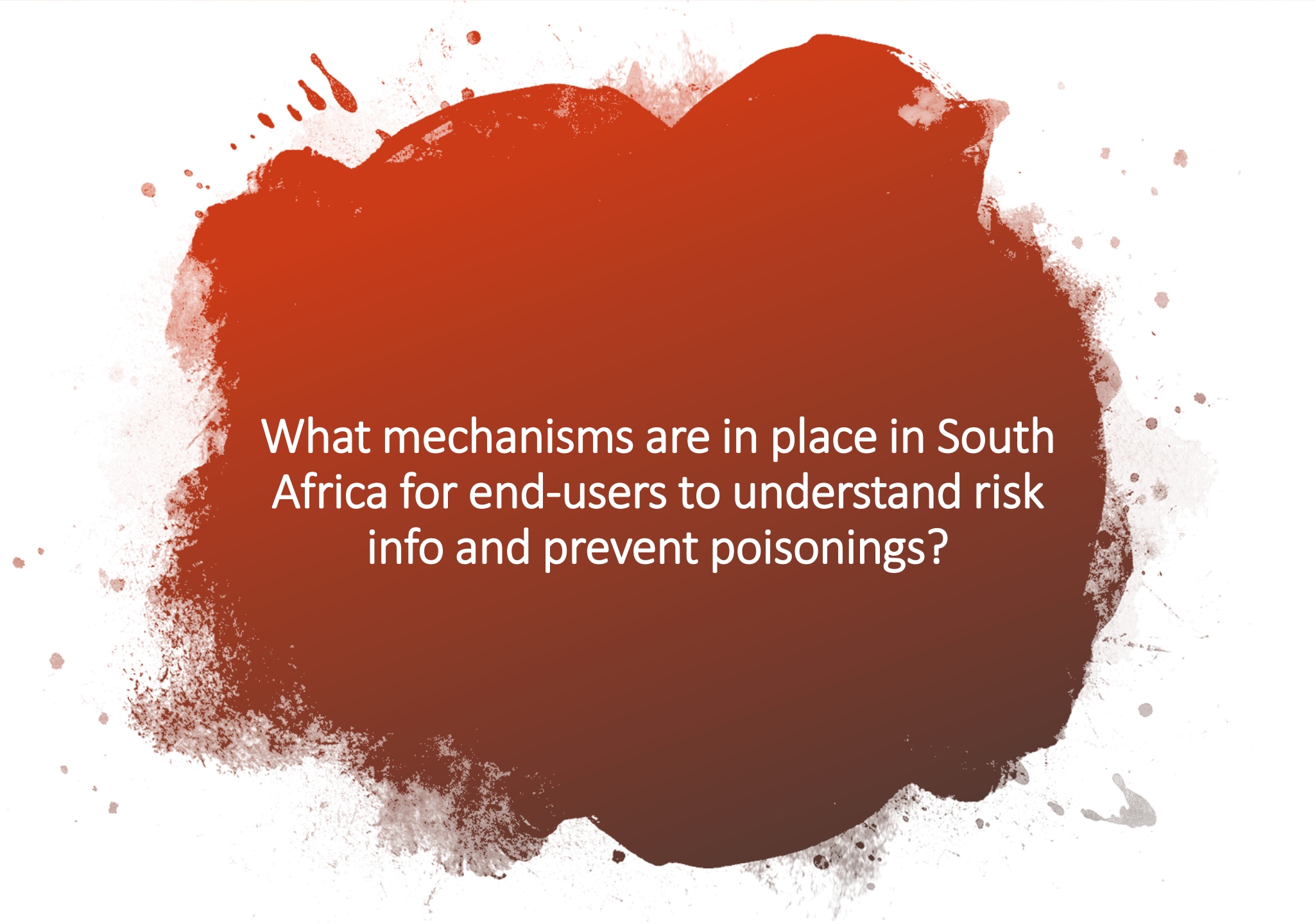
- Residents unaware of low toxic pest control
- Vendors unaware of low toxic products

# Address Complexity through Stakeholder Engagement

Figure 3: Stakeholders Needed to Reduce the Risks from Street Pesticides







What mechanisms are in place in South Africa for end-users to understand risk info and prevent poisonings?

# Labelling as a Risk Communication Tool



# 4 Colour Codes on SA Pesticide Labels as RC tool/risk decision making for acute toxicity

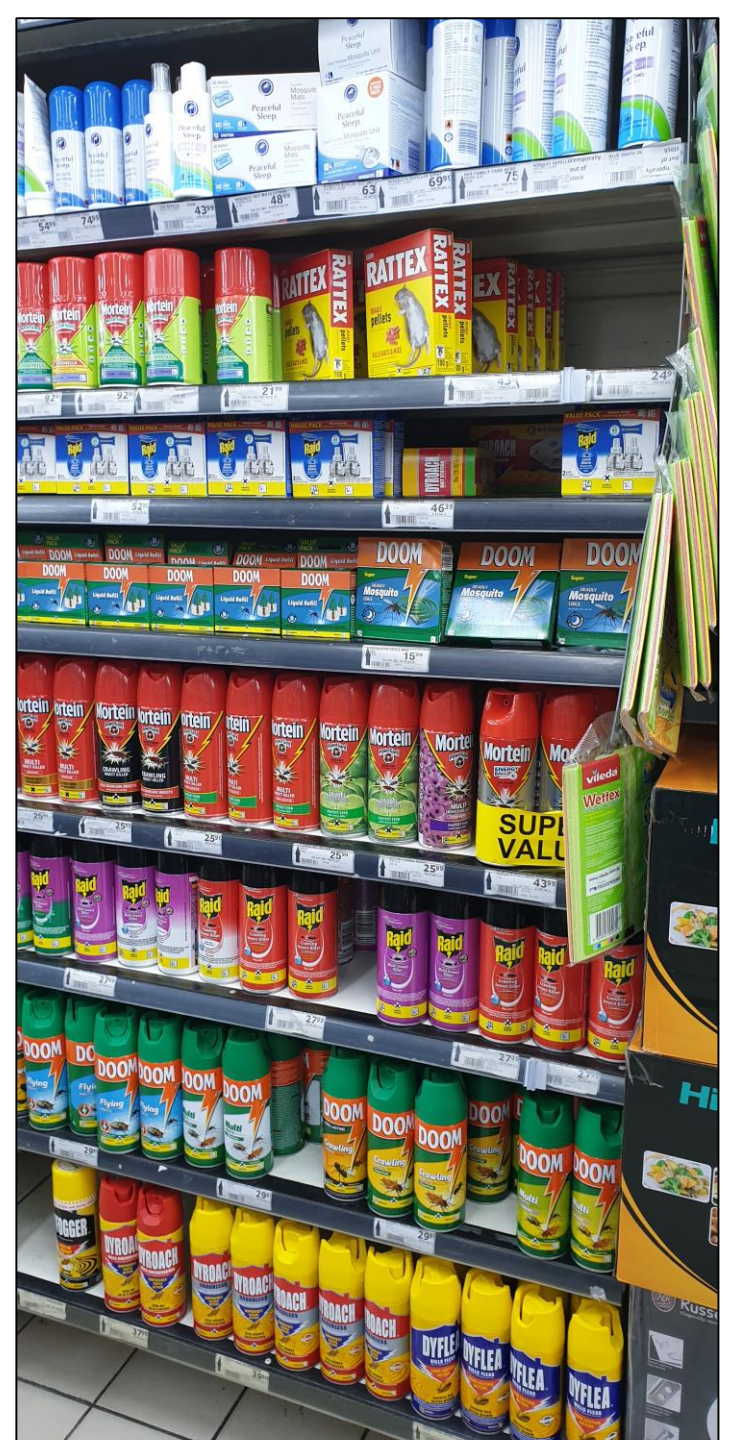
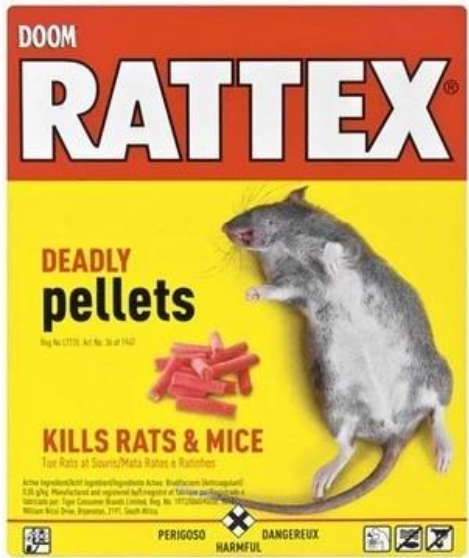
- **WHO toxicity classification based on pesticide's LD50:**
  - RED Code            Class Ia & Ib – extremely hazardous
  - YELLOW Code      Class II – highly hazardous
  - BLUE Code            Class III – moderately hazardous
  - GREEN Code          unclassified - less hazardous



# Pesticide Label Colour Codes Based on WHO Haz Classification

- What is their purpose? Exposure prevention? Protecting industry from liability?
- Colour code based on the AI or formulation
- Only on labels of pesticides sold in LMIC and not HIC – targeting low literate populations
- Chronic toxicity not represented
- Not an effective risk communication tool
  - Limited training & access to what they mean
  - How to protect based on colour not clear
  - Protects industry from liability rather than end-user





➤ **Five factors** pesticide **end-users** must achieve concurrently in order to understand and apply the information found on a pesticide label



**Pesticide labels: Protecting liability or health? – Unpacking “misuse” of pesticides**

Hanna-Andrea Rother

**Abstract**

Farmers, farmworkers, and other end-users in Low- and Middle-income Countries (LMIC) are often blamed for causing pesticide poisonings and environmental contamination because of “misusing” pesticides. The pesticide label is generally the main mechanism for communicating risk and use information to end-users. Five factors are presented that pesticide end-users must achieve concurrently in order to understand and apply the information found on a pesticide label. It is argued that end-users in LMIC are unable to fulfil these factors for social, cultural, political, and economic reasons. These factors are: access to the label, appropriate language, adequate literacy level (for reading and comprehension), and access to equipment and facilities. With label information being a poor risk communication vehicle, it is argued that the use of the term “misuse” of pesticides in the literature, and by regulators and industry inappropriately allocates blame of poisonings and environmental contamination to end-users. “Misuse” of pesticides should, therefore, be referred to as “unintended uses” to avoid apportioning undue blame to users who do not have access to risk, health and safety information (i.e., *right-to-know*) and/or are unable to interpret the messages as scientifically intended (i.e., *right-to-comprehend*).

**Addresses**

Division of Environmental Health, School of Public Health and Family Medicine, University of Cape Town, South Africa

Corresponding author: Rother, Hanna-Andrea ([handa.rother@uct.ac.za](mailto:handa.rother@uct.ac.za))

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For a complete overview see the Issue and the Editorial

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**Keywords**

Highly hazardous pesticides, Pesticide misuse, Risk communication, Right-to-know, Right-to-comprehend, Pesticide label

**Introduction**

Within the pesticide community (e.g., researchers, regulators, industry officials), particularly in relation to Low- and Middle-Income Countries (LMIC), pesticide poisonings and environmental contamination are often

blamed on farmers, farm workers and other end-users because of “misusing” pesticides. “Misuse” of pesticides assumes that the farmers, farm workers, and others have access to the relevant risk information, can read the information, are able to comprehend to a level where they can apply this information, and then have the means to implement the required safety and risk reduction behaviours [1,2]. The main source of risk, health and safety information for end-users, and often the only source, is the pesticide label. Pesticide labels are generated from the health and environmental risk assessment data found on Safety Data Sheets (i.e., Material Safety Data Sheets) produced by the company manufacturing the formulated product [1,3–6]. They are meant to provide essential and relevant information related to the active ingredient and formulated product (e.g., dosing measurements, re-entry intervals, personal protective equipment – PPE – required, toxicity level, health risks, and environmental risks). This article presents the argument that most pesticide end-users in LMICs are unable to fully comprehend and use the information on the labels, when they have access to it, to mitigate risk. Therefore, the use of the term “misuse” is inappropriately used for explaining why acute and chronic poisonings, as well as environmental contamination, are occurring in LMIC. There are many social, political, cultural and economic issues intertwined within understanding the use of the term “misuse”. Yet, the blaming nature of the concept shifts accountability unfairly to end-users. The recommendation is the expression “unintended uses” be used instead of the term “misuse”, thereby removing the blaming element. Furthermore, more efforts need to be made to support full comprehension of the content of pesticide labels, as well as substituting highly hazardous pesticides to reduce toxic exposures. Although several factors contribute to negative health and environmental consequences from end-users’ unintended uses of pesticides (e.g., absence of or fragmented legislation, lack of enforcement of legislation, inefficient agricultural extension services, unavailability of required PPE, weak pesticide management systems) [7–9], the focus of this article is on critically evaluating the role of the pesticide label as a risk communication tool.

**Pesticide label effectiveness**

Five key factors need to be fulfilled for a pesticide label to function as an effective risk communication tool. That is, to ensure that the measurement and re-entry instructions are followed, the correct safety precautions are used, the toxicity levels and implications

	Factor Title	Factor Details
Factor 1:	<b>Access to label</b>	The correct and up-to-date label must be on the pesticide container or package being used and in a font size that is readable. That is, the right-to-know [2,12].
Factor 2:	<b>Appropriate language</b>	The label must be in the language of the end-user [2,13].
Factor 3:	<b>Adequate literacy level - reading</b>	The end-user must be literate which includes being able to read the label language [13,14].
Factor 4:	<b>Adequate literacy level - comprehension</b>	The end-user must understand (i.e., comprehend) the content of the label information (particularly technical content and language). That is, the right-to-comprehend [2].
Factor 5:	<b>Access to equipment and facilities</b>	The end-user must have the means to implement the instructions and safety precautions for the toxicity level of the formulated product (e.g., access to the required PPE and water).

## Hazard Communication Vehicle



Use of pictograms to  
communicate health  
risks to low literate  
populations

1 – What is the scientifically intending meaning of this pictogram? Acute effects? Chronic effects?

2 – What safety behaviours should be implemented when this symbol is on a pesticides label?

# How is the public informed of chronic hazards?

- Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
- Not on pesticide labels yet
- Label accuracy checking limited



## GHS PICTOGRAM SYMBOLS AND MEANINGS

The United Nations Global Harmonized System of Classification & Labelling of Chemicals (GHS) is a new system with the objective of harmonizing information on labels & Safety Data Sheets (SDSs). The goal is to improve the protection of human health & the environment.

	<b>ACUTELY TOXIC:</b> Exposure to this chemical can cause immediate health problems.		<b>ACUTE HAZARD</b> This chemical may cause immediate health effects/reactions if exposed to it.
	<b>FLAMMABLE:</b> A flammable chemical is one that can easily catch fire and burn.		<b>ACUTE HAZARD</b> This chemical may cause immediate health effects/reactions, such as skin rashes and irritation, if exposed to it.
	<b>ENVIRONMENTAL HAZARD:</b> This is a chemical that can damage or kill fish or other aquatic organisms.		<b>CHRONIC HAZARD:</b> Prolonged or repeated exposure to this chemical may cause long term health effects as cancer or birth defects.
	<b>EXPLOSIVE:</b> This chemical is one that can blow up and cause an explosion.		<b>REPRODUCTIVE HAZARD:</b> Exposure to this chemical can cause problems for a person's ability to have children or cause birth defects in offspring.
	<b>OXIDIZING:</b> This chemical can react, even in the absence of air, with other chemicals and cause fire.		<b>CARCINOGENIC:</b> Exposure to this chemical may cause cancer.
	<b>CORROSIVE:</b> This chemical can cause severe damage to eyes, skin, metal and other materials.		<b>COMPRESSED GAS:</b> This chemical is under pressure and may explode if the cylinder is heated or ruptured, and contents may cause burns.
<b>SIGNAL WORDS</b>	<b>DANGER:</b> For more severe hazards that may affect your health if you are exposed to it.	<b>WARNING:</b> For less severe hazards that may affect your health if you are exposed to it.	

For More Information on the GHS: [www.unitar.org](http://www.unitar.org)

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Tel: +27 (0)21 406 6719  
www.coehr.uct.ac.za

Contact: [oeh-pesticides@uct.ac.za](mailto:oeh-pesticides@uct.ac.za)


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What happens if the pesticide is illegal and not or incorrectly labelled?





How do end-users in South Africa  
access pesticide health risk info to  
prevent exposure risks and poisonings?

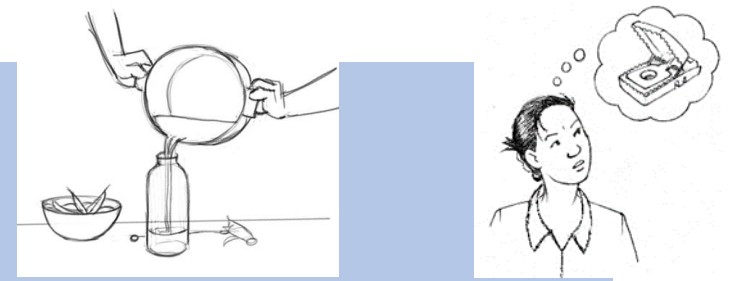
# Access to Pesticide Health Risk Info to Reduce Poisonings

- Are labels for protecting health or industry liability?
- Where is the information on what the colour codes mean available to all South Africans?
- How will the GHS symbols be taught?
- Shifting from access to info (***right-to-know***) to understanding what the info on label means (***right-to-comprehend***)

# Training



# Informal Vendor Training

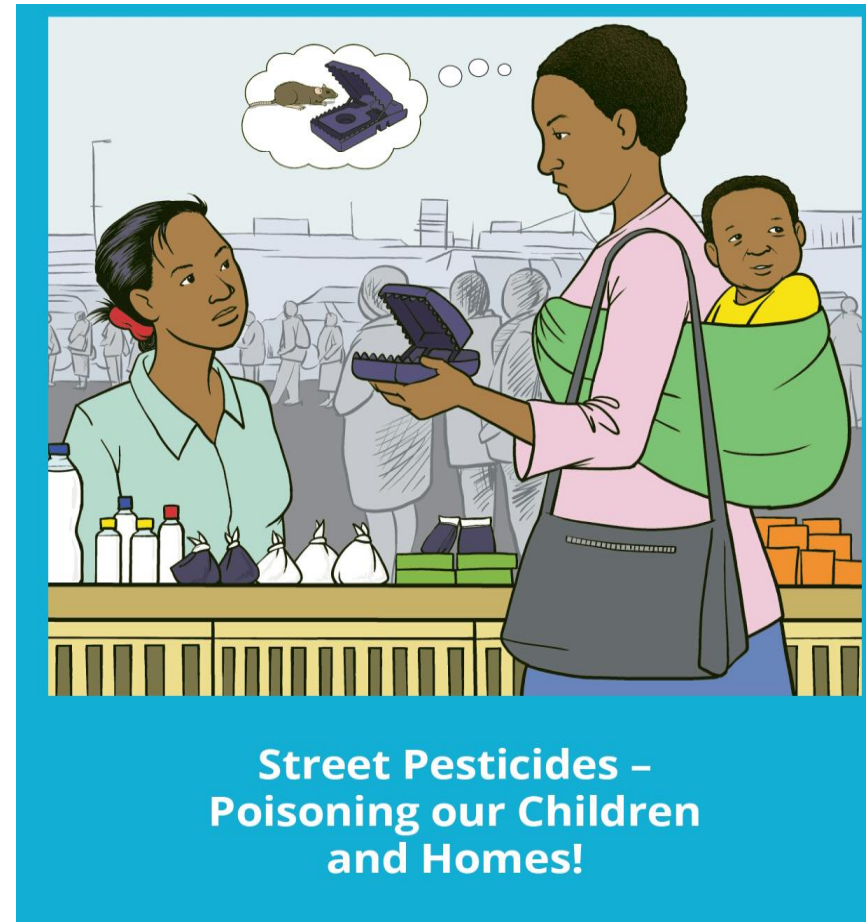


- Limited knowledge of the risks
- Some assume products are legal
- Willing to try alternatives
  - Must be effective and cheap
  - Require information on alternatives



# Training Materials: Street pesticide flip chart

- **Training materials needed to promote:**
  - ✓ Understanding
  - ✓ Empower trainers & communities
  - ✓ Standardization of information provided



## INTRODUCTION FOR PRESENTER

This flip chart is a guided training tool for Environmental Health Practitioners (EHPs) and Assistants (EHAs), as well as Community Health Promoters (i.e., the **presenter**) to use when training different community groups (i.e., the **audience**) on the dangers of using street pesticides. It also provides alternative methods of pest control, as well as how to keep pests away through improved hygiene practices.

The flip chart is set up in such a way that on one side (**facing the presenter**) is the text in multiple languages, for presenting the information, and on the other side (**facing the audience**) is the

corresponding information in pictures. The intention is to engage the **audience** through the pictures and verbal story told. The **presenter** should read the text that is facing him/ her which tells a story of the health risks of using "street pesticides" and how to prevent pests from coming into the home without the use of pesticides.

- **Important note:** You will notice there are several characters with no names. It is up to you, the **presenter**, to give names to each character relevant to the group you are presenting to, or simply use generic terms such as "mama" and "the informal vendor".

### Flip-chart characters include:



Environmental Health Practitioner (EHP)



Mama



Mama's daughter



Informal vendor selling street pesticides



At the end of a section you will see this symbol to indicate that at that point you should stop and have a brief discussion with your group. Questions are listed as suggestions. You are, therefore, encouraged to add your own questions. This is an opportunity for you to correct misunderstandings or address concerns.

## INTRODUCTION TO READ TO PARTICIPANTS

Let me introduce you to four characters you will see throughout this presentation. [Point to each as you talk]. The EHP or EHA, Mama, Mama's daughter and the informal vendor selling street pesticides.

*Street pesticides* are chemicals that are illegally used for home pest control, predominately in low socio-economic communities. **These chemicals are illegal for two reasons:**

- 1) They are pesticides registered to be used in agriculture only that have been decanted out of their original packaging and do not have the original label on them. They are far too toxic and dangerous to be used in the home; and
- 2) Some are products packaged to look like a commercially sold pesticide but are not registered for use in South Africa (e.g. coming from China). To be a **legal pesticide**, it must have a South African **L registration number** (e.g. L 1101), say **Act 36 of 1947** on the label and still be in the **original container**.



**Acute toxicity danger symbol**  
for showing that health effects are caused in the short-term

The short-term **danger** and **acute toxicity** is represented in the flip-chart pictures by a skull and crossbones symbol in a yellow, diamond-shaped pictogram.

Many people are unaware of the **short-term (acute) and long-term (chronic) health risks** associated with street pesticides. Street pesticides are highly toxic and very dangerous. If someone eats or drinks these pesticides, they will get sick and may even die. If an adult or child survives the immediate effects of a poisoning, the concern is that they could experience health problems from this exposure in years to come (e.g., cancer, asthma).

Throughout this flip chart you will see the following symbols for short term danger and to show there is a residue.

[Note to presenter: read the text under each picture to the participants]



**Invisible danger symbol**  
for residues

Pesticides also present a danger after someone has applied these toxic products. Many people are unaware that the danger may still be present as a residue. The picture above is, therefore, used throughout the flip chart to show a pesticide residue as an invisible danger.

The invisible danger symbol is used to show that although pesticides may not be seen or smelled, they may still be present as residues on clothing, beds, food, furniture, floors, dishes or on the skin, and can cause short- and long-term health effects.

## Street Pesticides Cause Sickness and Even Death!



- The next day, mama's daughter crawls under the kitchen table and finds the plate with the poison mixed with food.



- The daughter eats some of the poisonous mielie meal.
- She is too young to know that it is very dangerous and she should not touch it.



- The daughter starts to feel very sick and shows signs of immediate effects from eating the pesticide.
- These signs of poisoning are:
  - Crying;
  - Watering eyes, sweating with lots of saliva;
  - Vomiting;
  - Difficulty breathing;
  - Diarrhoea (a runny tummy) and;
  - Shaking a lot, and sometimes convulsions.
- If the daughter does not die from eating the poison, she could have problems in the future, such as:
  - Problems with her growth and development and;
  - Difficulty learning.

## Street Pesticides Cause Sickness and Even Death!



- What have you heard or know about children who have been poisoned by street pesticides?
- What did you or someone else do in this case?





# Offering Alternatives to Street Pesticides: Low Danger Pest Control Booklet

Without low toxic alternatives made available to communities, street pesticides will continue to be used and in demand.



Division of Environmental Health  
School of Public Health and Family Medicine  
Isikolo Sempleto Yonintu kunye Namayaza Osapho  
Departement Openbare Gesondheid en Huisartskunde

 UNIVERSITY OF CAPE TOWN  
LEADING IN RESEARCH. PROMOTING EXCELLENCE.

## Ant Control: Bicarb Bait



House Black Ant



Garden Ant



Sugar Ant

### ANT FACTS

If you smoke, always wear plastic gloves when making ant bait or the ants will sense the tobacco smoke on the bait and not go to it. Ants do not like cigarette or cigar smoke.

### INGREDIENTS

10 teaspoons Jam  
or Syrup  
1 teaspoon  
Bicarbonate of soda

### EQUIPMENT

Teaspoon  
Damp paper towel  
Plastic lid

### PURPOSE

This bait is for killing  
ants. **Place out of reach  
of children and pets.**



You can make your own mixture to control ants by following these steps:

### STEP 1

Mix ten (10) teaspoons of jam or syrup with one (1) teaspoon of bicarbonate of soda. Mix well.



### STEP 2

Place a few spoonfuls of the mixture onto a plastic lid and place the lid near where you see ants. Replace the bait often as ants prefer fresh bait.



### STEP 3

Wipe up the dead ants using a damp paper towel. Throw the dead ants and the cloth into a rubbish bin with a lid.

- Detailed step-by-step instructions on how to make the pest control alternative

# Children are the most vulnerable to pesticide poisonings



## In conclusion:

- Highly hazardous pesticides should be eliminated in SA due to street pesticide use
- Legislation should have children as the denominator
- Aggressive interventions needed to protect children from morbidity and mortality

